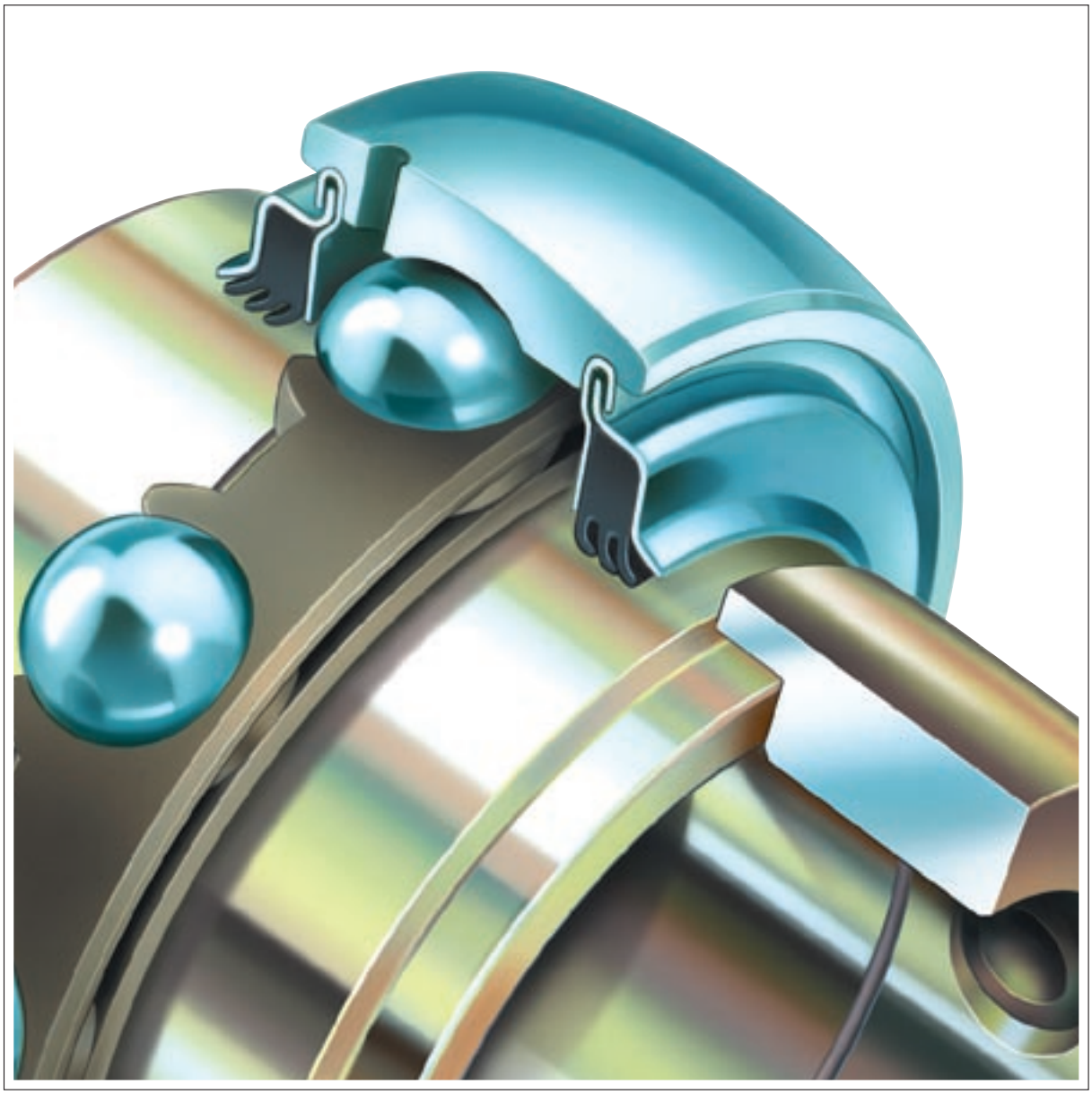


Expertise in Agricultural Engineering

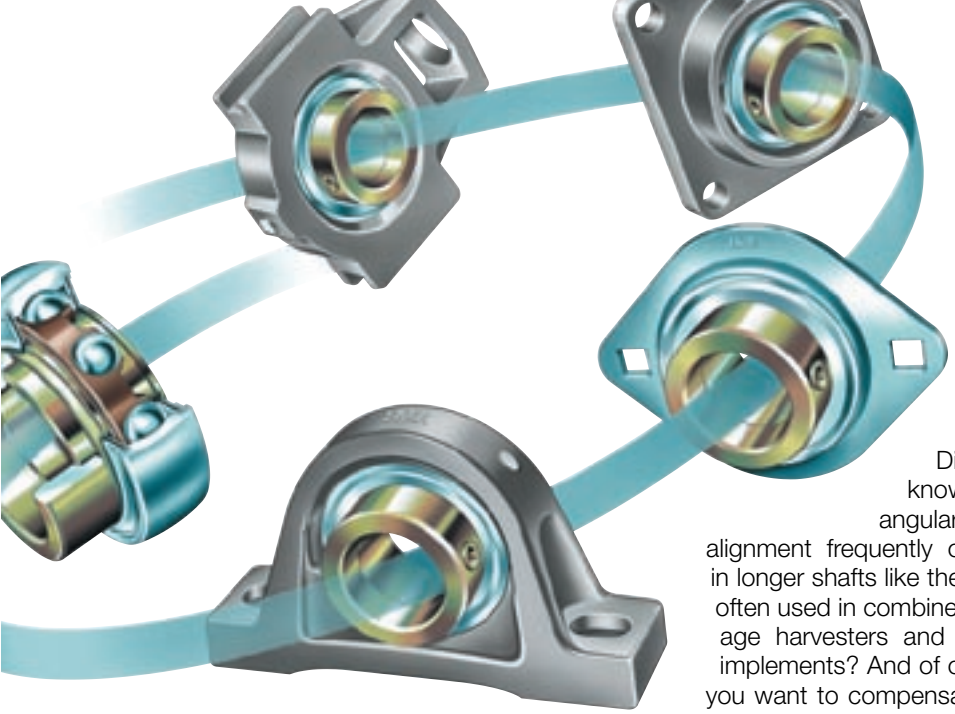
Expertise in Agricultural Engineering

Every farmer or manufacturer of agricultural machinery knows the problems: Machines and equipment must withstand harsh conditions such as dirt, vibration, flying stones and moisture every day. At the same time, the demands on the machinery are steadily increasing, and more and more output is required. Robust, reliable bearings for moving machine-components are extremely important, and everything must run fast and without friction.

Requirements like these are reason enough to consider using INA bearings. For decades now, we at INA have been developing and manufacturing rolling bearings and other components for agricultural machinery, and we are constantly developing new ideas. Whether it's innovative methods of sealing or anti-corrosion protection coatings – we are always working for you. Tailor-made solutions for the most demanding ambient conditions.

Expertise in agricultural engineering. This includes products matched to your application and good service. Contact us and see for yourself!

INA *Creative Technology*



From proven radial insert ball bearings ...

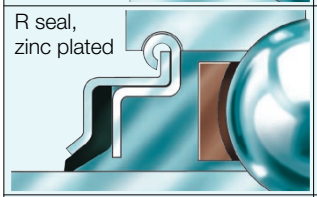
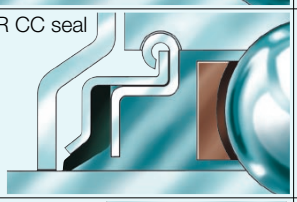
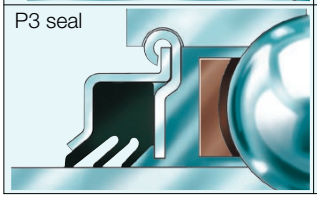
Did you know that angular misalignment frequently occurs in longer shafts like the ones often used in combines, forage harvesters and tillage implements? And of course you want to compensate for this as much as possible.

To solve this problem, our engineers have developed the radial insert ball bearing with the characteristic contoured outer ring. INA radial insert ball bearings are self-aligning bearings that are very easy to handle. And due to our effective manufacturing methods, we can supply these bearings for a very good price. The bearings are installed in a spherical housing and represent an optimum means of compensating for angular misalignment of shafts. The units can support axial and radial loads and allow a simplified design for mating components.

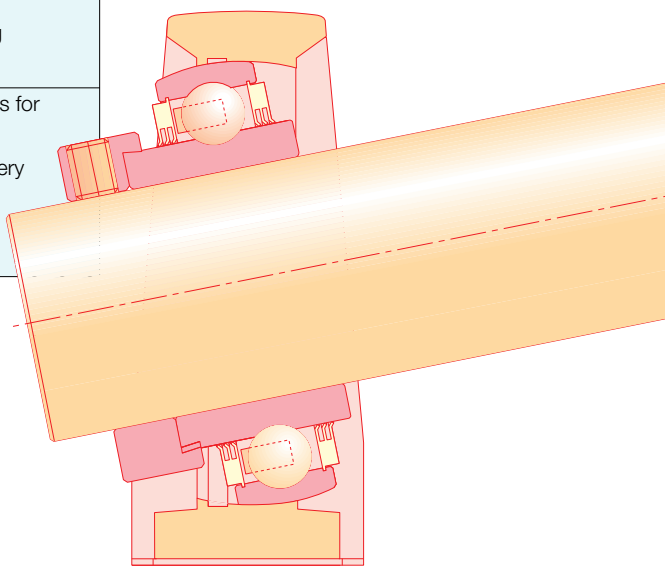
With the current emphasis on output and cost-reduction, product service life is becoming increasingly important. The ambient conditions are also important for agricultural machinery. Since dirt and dust are an everyday occurrence, the bearings must be effectively sealed.

INA's solution calls for a comprehensive sealing system for radial insert ball bearings. Having worked closely with users for many years now, we can provide the right seal for every application.

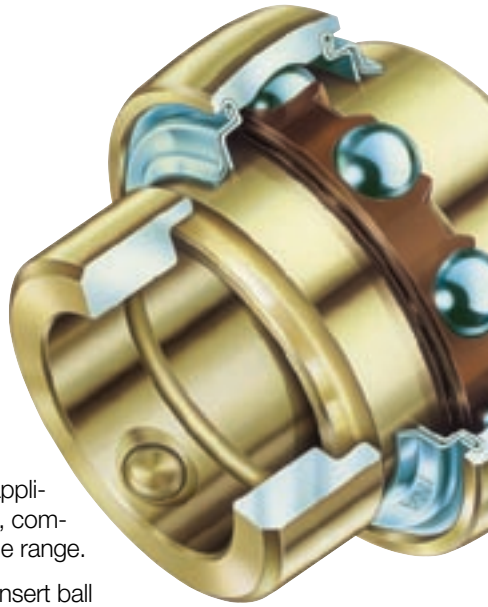
Our range of seals includes the basic P seal, the R and R CC seals and the P3 seal, which can resist the most extreme ambient conditions. All of these three-part seals consist of zinc-plated external and internal sheet-steel components and are staked in the outer ring. This keeps the dirt outside and the grease inside.

Seals for Radial Insert Ball Bearings	Features and Advantages
P seal, zinc plated 	• minimum overall width • for normal operating conditions • axial contact
R seal, zinc plated 	• good sealing effect with radially preloaded seal lip • larger grease reservoir • longer relubrication intervals
R CC seal 	• outboard flinger type shield provides additional protection against mechanical damage • effective protection of seal lips, e. g. for high-pressure cleaning
P3 seal 	• three radially preloaded seal lips for extreme contamination • suitable for agricultural machinery such as disk plows and cultivators

INA's sealing concept for radial insert ball bearings



... to advanced housing units with special seals



Forage harvester at work

Installing it yourself saves time and money. Always possible with INA bearing technology

Our range of seals provides solutions for the most varied operating conditions. But what happens if dirt and moisture are present? Transport and feeding still have to be done even when it is raining.

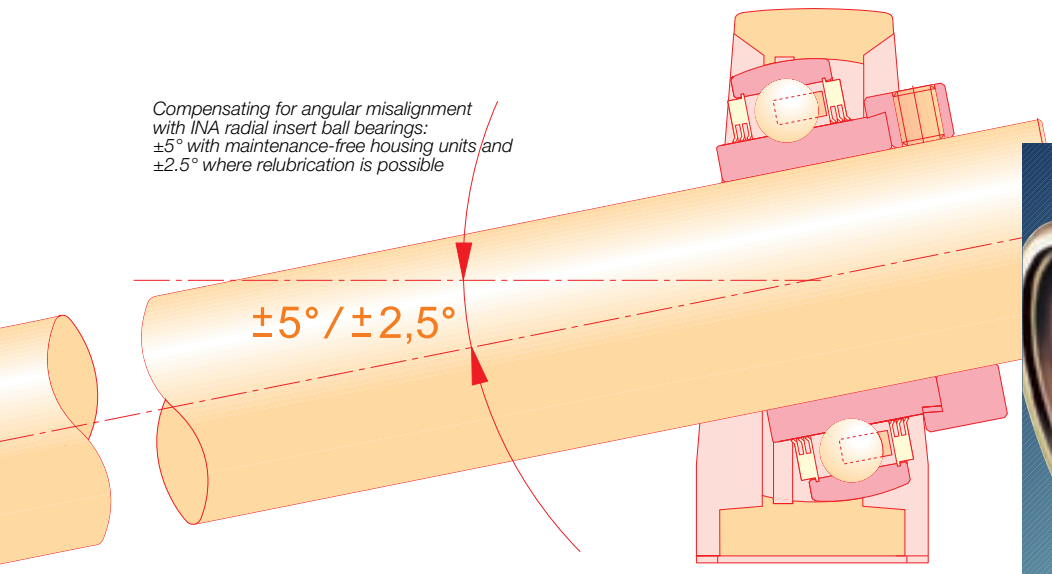
Our patented Corrotect® anti-corrosion protection coating offers a cost-effective alternative to expensive stainless-steel bearings. Radial insert ball bearings or housing units with this thin, electroplated coating resist corrosion for long periods. In addition, all radial insert ball bearings for agricultural machinery are furnished with Corrotect®-plated eccentric locking collars and inner rings (metric version).

We can design the optimum radial insert ball bearing assembly for your application. Bearings are also available in inch dimensions. We keep a wide range on hand including bearings with eccentric locking collars or set screws in the inner ring. They can be combined with any type of seal. The weight-optimized gray cast iron or sheet steel housing design makes the bearings suitable for combinations with all INA radial insert ball bearings. Our proven high-temperature bearings and bearings with adapter sleeves, which are particularly suitable for high-speed rotary applications, complete the range.

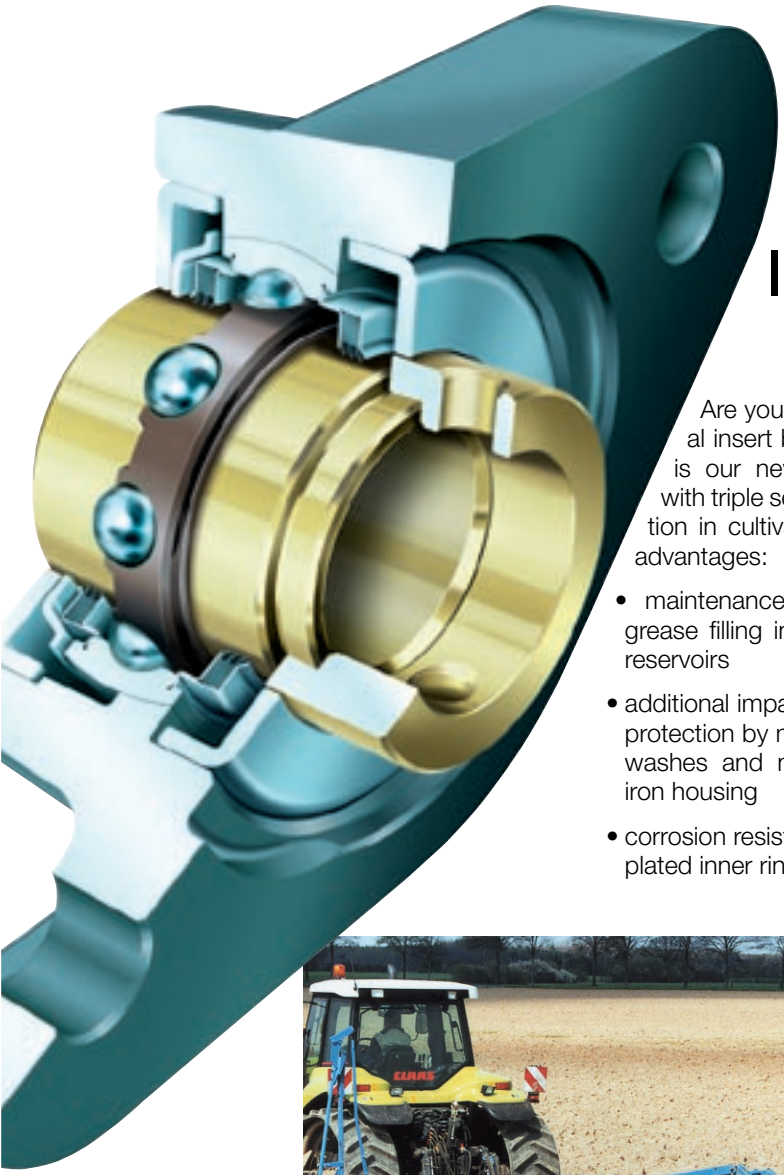
Radial insert ball bearing units with the advantages described above are used in virtually all machine-building sectors, including material handling, ventilation, textiles, machine tools and the beverage industry. As you can see, we are well familiar not only with agricultural machinery but also equipment and machines for many other industries. Fertile soil for new ideas.

Contact us and see for yourself! Simply fill out the reply card on the back of this brochure to request more information on our range of radial insert ball bearings! We'd be happy to assist you in your design.

Compensating for angular misalignment with INA radial insert ball bearings: ±5° with maintenance-free housing units and ±2.5° where relubrication is possible



Compare for yourself: Corrotect®-plated part and unplated part after a two-hour salt spray test



Down to earth with INA bearings ...

Are you familiar with this radial insert ball bearing unit? This is our new RCJT special unit with triple seals. This proven solution in cultivation work has many advantages:

- maintenance-free with maximum grease filling in bearing and grease reservoirs
- additional impact and contamination protection by means of solid flanged washes and nodular graphite cast iron housing
- corrosion resistant due to Corrotect® plated inner ring and eccentric ring.

These features make INA radial insert ball bearing units tailor-made for your agricultural equipment, which must be adaptable to continuously changing soil conditions. After all, every growing season is different.

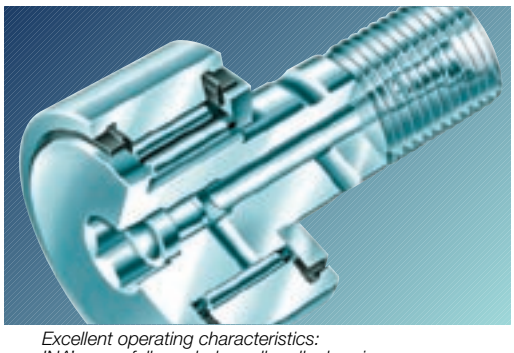
The only operations that stay the same are those from tilling to harvest: Plowing, seeding, fertilizing and plant protection, mowing or cultivation. And of course, all these jobs require special machinery. INA can supply the right bearing for a wide variety of agricultural machinery applications.

Examples include idler pulleys or chain tensioners for driving the vibrating sieves and elevators in combines. The right combination of sealing elements effectively protects the ball bearings against dust and lubricant loss.

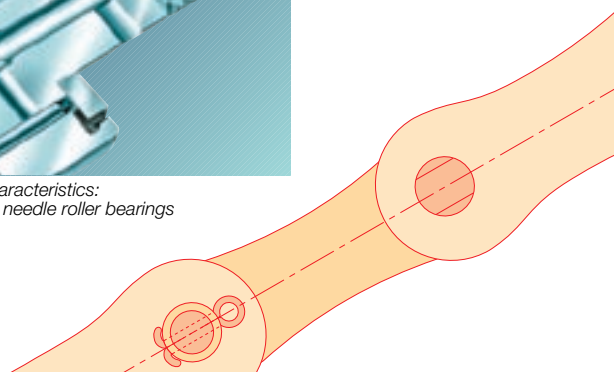
We'd be happy to provide you with more information on these ready-to-install tensioning elements. Contact us and see for yourself!

For the optimum adaptation to soil conditions: INA's radial insert ball bearing units in the "Kompaktor" combination seeder/harrow

Quieter running with complete INA tensioning elements



Excellent operating characteristics: INA's new, fully sealed needle roller bearings



... right through the growing season

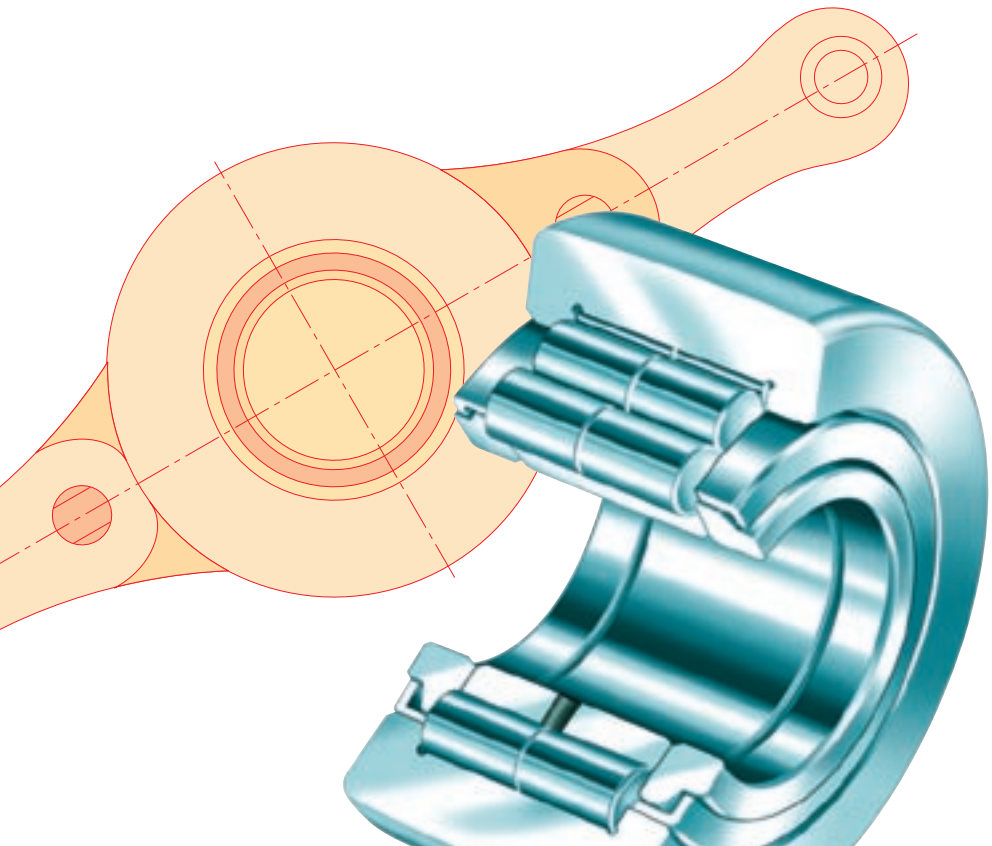
Forage boxes normallly operate with rotating movements. For smooth loading of the harvest into the container, they are controlled via a curved path that is designed to be as level as possible.

The design solution calls for yoke type track rollers that run on a control cam with an inside and outside race. The direction of travel changes continuously, depending on whether loads are to be lifted or lowered.

INA's PWTR yoke type track rollers with patented outer ring profile is just right for this application. They have a high load capacity, are low wear units and are effectively sealed. This prevents the dust and fibers generated during loading to enter the bearing. The particularly large grease reservoir ensures long-term operation without relubrication. In addition, the yoke type track rollers are designed so that the grease reservoir can be optimally filled during relubrication.

INA bearings can also be found at many other positions in agricultural machinery. The range includes needle roller bearings in front rakes and many other applications.

Since there is not enough space here to give a complete overview of our product range, we recommend that you ask for our CD-ROM ***medias***® *professional* (what else would you expect in this multimedia age?). This product-selection and design-aid package can also be found on the Internet. Visit our website at: www.ina.com and give it a try.



Forage boxes have many applications for INA bearings

Positive engagement: INA's square housing unit is easy to mount on loader chain shafts

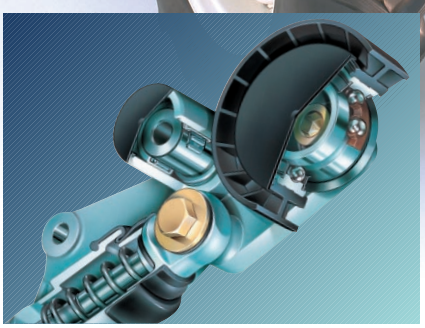
There’s no sand in the gearbox with INA vehicle components ...

The work that one or two horses used to perform to plow the field is now done by all-wheel drive tractors at high speeds (equaling the power of up to 240 horses). Today’s working speeds place ever-increasing demands on gearboxes, engines and auxiliary machinery, which in turn means higher bearing requirements.

As an experienced supplier of the automotive industry we also furnish reliable bearing units and parts for tractor engines, such as hydraulic tensioning elements, tension pulleys and water pump bearings.

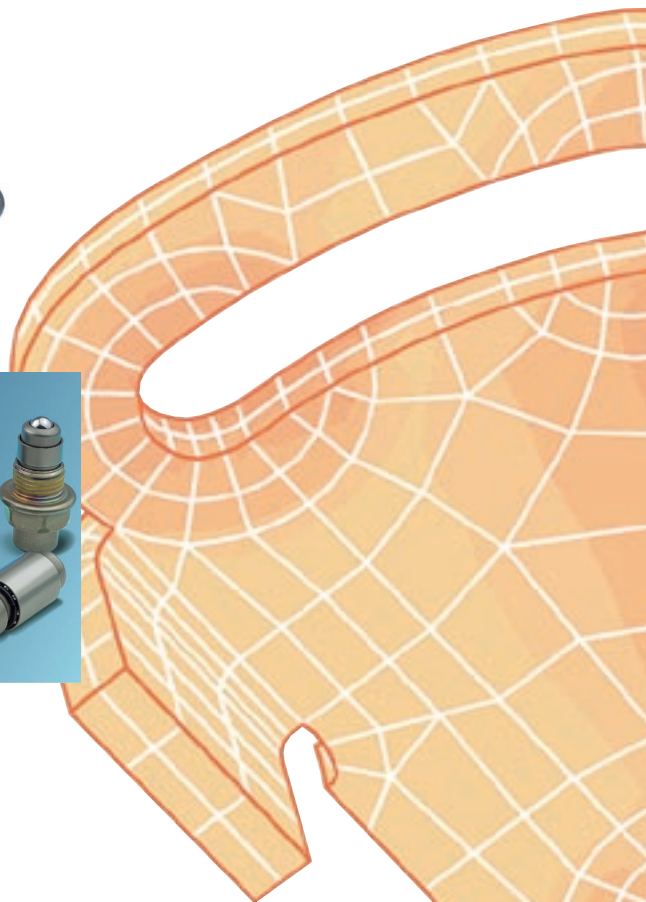
A large number of INA products can also be found in gearboxes and gear-shifting mechanisms: low-wear synchronizer rings secured against rotation, needle roller and cage assemblies and fine-blanked parts having the most complex shapes and designs. We are specialists in this field, and for you that means lightweight components that are matched to the application, protected against corrosion and highly wear-resistant.

Ask us about our cost-effective design solutions!



Cost-effective: A ready-to-install belt-tensioning unit increases the service life of the system

Corrosion-resistant INA gear-shift detents make gear shifting easier



... and the right calculation service

Providing good service is important to us. Imagine the effort required to calculate a power take-off or a cut-length gearbox, e.g. for a farm tractor or a forage harvester. The gearbox elements must be defined, the load distribution must be analyzed and all operating conditions must be taken into consideration ...

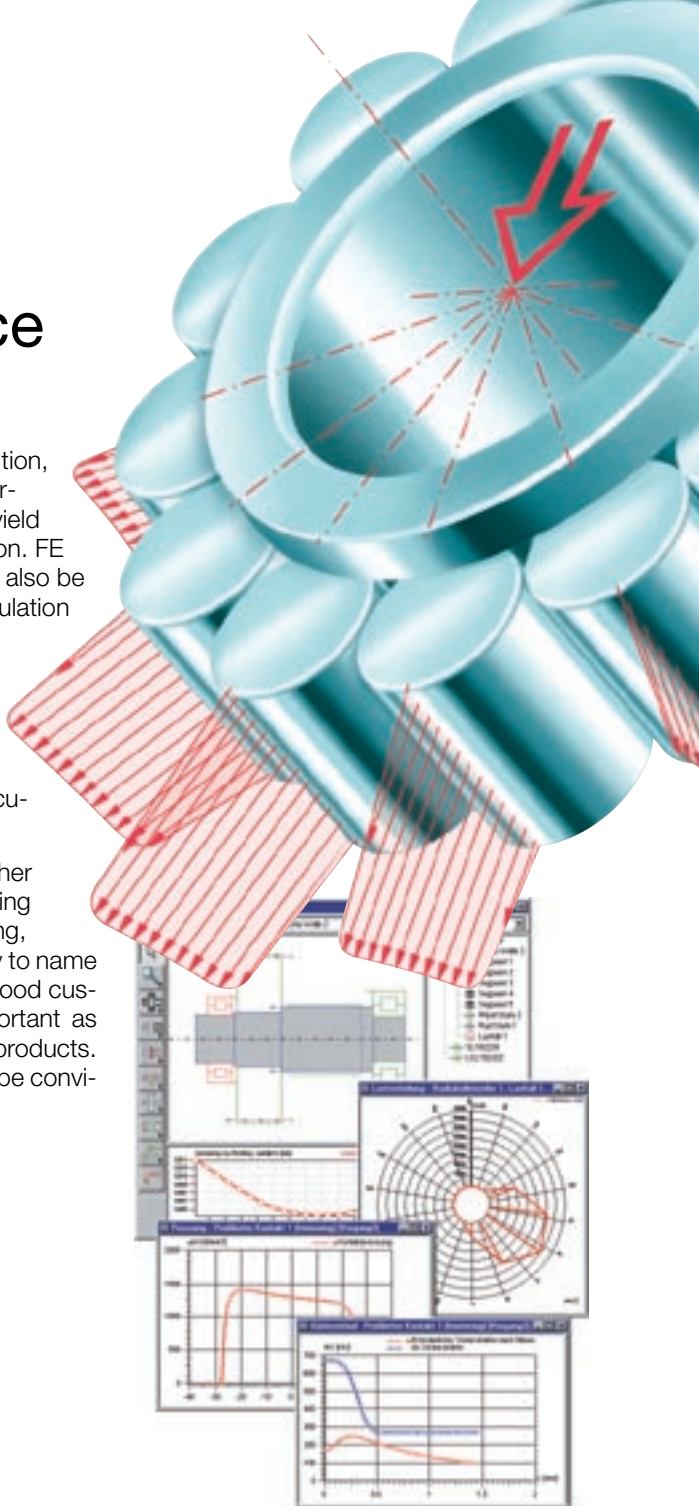
For tasks like this, it would be a good idea to consider seeking professional assistance for the design of the bearing arrangements. All you have to do is ask our design engineers on site. They have BEARINX®, INA's powerful rolling bearing calculation program with CAD interface.

This program can calculate the optimum bearings for your application. BEARINX® emulates the entire system and can reproduce all the shifting positions in your gearbox. The load on every single bearing arrangement can be depicted very percisely, calculated and then recorded. The same applies to shaft deflection or tilting. Even the deformation in the area surrounding the bearing can be analyzed at any time.

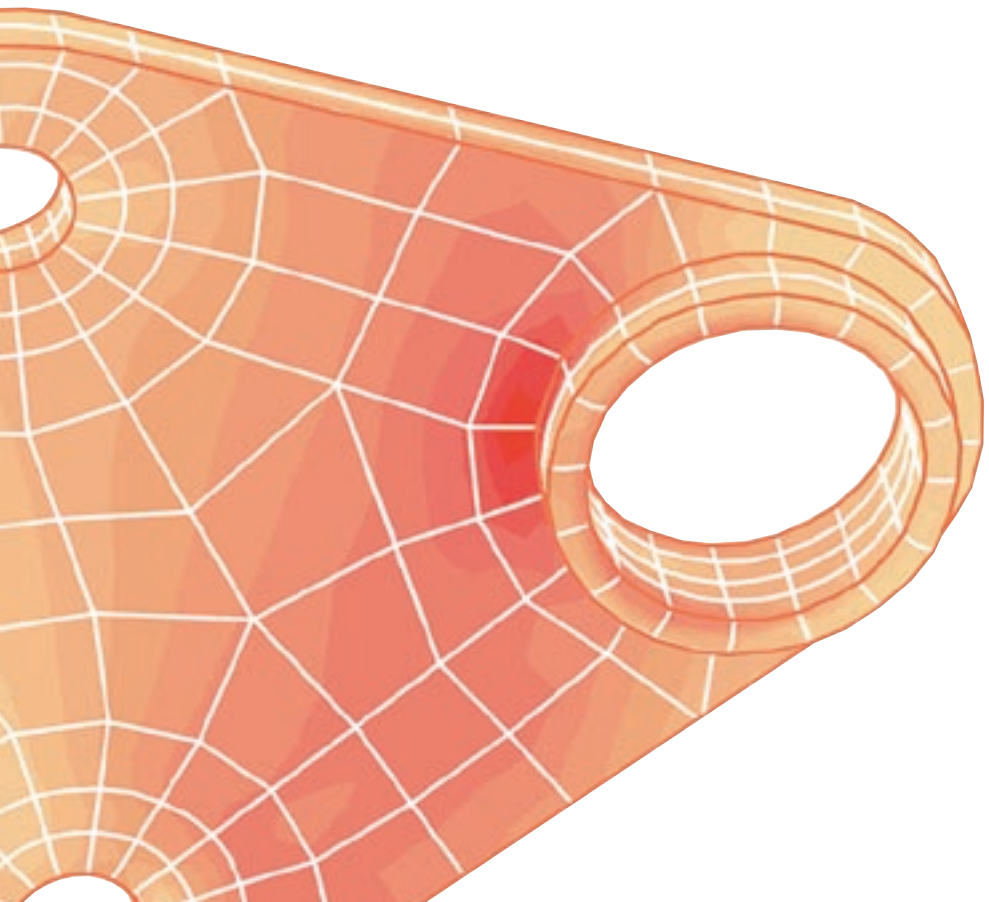
Manipulating the bearing position, shape or size will reveal performance reserves that quickly yield the most cost-effective solution. FE analyses and simulations can also be performed as part of our calculation service.

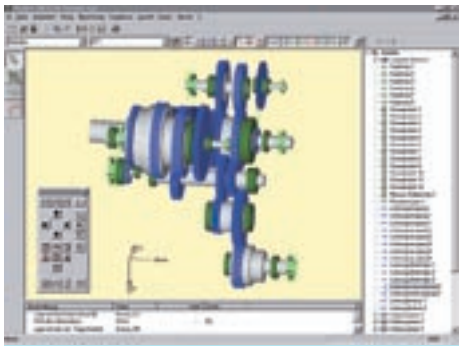
To ensure that everything is clear and easy to understand, INA's engineering service provides customers with complete calculation documentation.

We can also provide many other on-site services such as bearing analyses, materials engineering, technical testing and tribology to name just a few. For us, providing good customer service is just as important as manufacturing high-quality products. Contact us. We're sure you'll be convi-need.



BEARINX® graphically summarizes the calculated bearing values and shows at a glance whether they exceed the limits





The first step in calculating INA bearings with BEARINX®: Virtual 3D modeling of the application

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